

## **E.2.2 LOWER COLUMBIA RIVER CHUM SALMON**

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### **E.2.2.1 Summary of Previous BRT Conclusions**

The NMFS last provided an updated status report on Columbia River chum in 1999 (NMFS 1999). As documented in the 1999 report, the previous BRT was concerned about the dramatic declines in abundance and contraction in distribution from historical levels. The previous BRT was also concerned about the low productivity of the extant populations, as evidenced by flat trend lines at low population sizes. A majority of the previous BRT concluded that the Columbia River chum salmon ESU was likely to become endangered in the foreseeable future and a minority concluded that the ESU was currently in danger of extinction.

**Current Listing Status**—Threatened

### **E.2.2.2 New Data and Updated Analyses**

New data include spawner abundance through 2000, with preliminary estimate of 2002, new information on the hatchery program, and new genetic data describing the current relationship of spawning groups. New analyses include designation of relatively demographically independent populations, recalculation of previous BRT metrics with additional years data, estimates of median annual growth rate ( $\lambda$ ), and estimates of current and historically available kilometers of stream.

#### **Results of new analyses**

**Historical population structure**—As part of its effort to develop viability criteria for Columbia River chum salmon, the Willamette/Lower Columbia Technical Recovery Team (WLC-TRT) has identified historically demographically independent populations (Myers et al. 2002). Population boundaries are based on an application of Viable Salmonid Populations definition (McElhany et al. 2000). Myers et al. (2002) hypothesized that the ESU historically consisted of 16 populations (Figure E.2.2.1). The populations identified in Myers et al. (2002) are used as the units for the new analyses in this report.

The WLC-TRT partitioned Columbia River chum salmon populations into a number of “strata” based on ecological zones (McElhany et al. 2002). The WLC-TRT analysis suggests that a viable ESU would need multiple viable populations in each of these strata. The strata and associated populations for chum are identified in Table E.2.2.1.

Table E.2.2.1. Historical population structure of Columbia River chum populations. The populations are portioned into ecological zones which are based on ecological community and hydro dynamic patterns. The EDT estimate of historical abundance is based on analysis by WDFW of equilibrium abundance under historical habitat conditions (Busack and Rawding 2003). “ND” indicates no data.

<b>Ecological Zone</b>	<b>Population</b>	<b>EDT Estimate of Historical Abundance</b>
Coastal	Youngs Bay	ND
	Grays River	7,511
	Big Creek	ND
	Elochoman River	ND
	Clatskanie River	ND
	Mill, Abernathy, Germany	ND
	Scappoose Creek	ND
Cascade	Cowlitz River	141,582
	Kalama River	9,953
	Lewis River	89,671
	Salmon Creek	ND
	Clackamas River	ND
	Sandy River	ND
	Washougal river	15,140
Gorge	Lower Gorge Tributaries	>3,141
	Upper Gorge Tributaries	>8,912
	<b>Total</b>	<b>&gt;283,421</b>

### Abundance, distribution and trends

Chum salmon in the Columbia River once numbered in the hundreds of thousands of adults and, at times, approached a million per year (Figure E.2.2.2). The total number of chum salmon returning to the Columbia River in the last 50 years has averaged perhaps a few thousand per year, returning to a very restricted subset of the historical range (Table E.2.2.2 and Figures E.2.2.2 – E.2.2.3). The status of individual populations is discussed below. References for abundance time series and related data are in Appendix E.5.2. Significant spawning occurs in only two of the 16 historical populations, meaning that 88% of the historical populations are extirpated, or nearly so. The two extant populations are at Grays River and the Lower Gorge (Figure E.2.2.2). The status of individual populations and groups of populations are discussed below.

**Grays River**—The majority of chum salmon spawning in the Grays River currently occurs in less than 1 mile of the river. Prior to its destruction in a 1998 flood, an artificial spawning channel created by WDFW in 1986, was the location of approximately 50% of the spawning in the Grays River population. Two time series of abundance were available for the Grays River chum salmon population (Table E.2.2.1 and Figures E.2.2.4 -E.2.2.5). One data set by Hymer and others was available on Stream net and covered the years 1944-2000. The other data set covers the years 1967-1998 and was provided by Dan Rawding of WDFW to correct some perceived errors in the expansions used in the Hymer et al. dataset. The Rawding estimates are believed to be more accurate, but both datasets are included in this report because the Hymer et al. series includes estimates both earlier and more recent than the Rawding data set. The Rawding data set shows a small upward trend and  $\lambda$  from 1967-1998 (Table E.2.2.3) and a low probability that the population is declining (Table E.2.2.4). However, the longer Hymer et al. data set indicates both long- and short-term trends are negative over the period 1950-2000, with a high probability that the trend and  $\lambda$  values are less than one. There was insufficient data to estimate the short-term trend (i.e. since 1990) using the Rawding data.

Table E.2.2.2. Recent abundance estimates for subset of Columbia River chum populations. Two different time series estimates are available for the Grays River Population. The majority of Columbia River chum currently spawn as part of either the Grays River or Lower Gorge Populations.

Population		Years for Recent Means	Recent Geometric Mean	Recent Arithmetic Mean
Grays River	Rawding estimate	1994-1998	704	812
	Hymer et al. estimate	1996-2000	331	576
Lower Gorge		1996-2000	425	490

Table E.2.2.3. Trend and growth rate for subset of Columbia chum populations (95% C.I. are in parentheses). The long-term analysis used the entire data set (see Table C.2.4.2 for years). Short-term data sets include data from 1990 to the most recent available year. The  $\lambda$  calculation is an estimate of what the natural growth rate would have been after accounting for hatchery-origin spawners. Two different time series estimates are available for the Grays River Population.

Population		Years of Time Series	Long-Term		Short-Term	
			Trend in Abundance	Median Growth Rate ( $\lambda$ )	Trend in Abundance	Median Growth Rate ( $\lambda$ )
Grays River	Rawding estimate	1967-1998	1.058 (1.021-1.096)	1.043 (0.957-1.137)	Not enough data	Not enough data
	Hymer et al estimate	1951-2000	0.990 (0.965-1.016)	0.954 (0.855-1.064)	0.904 (0.661-1.235)	0.807 (0.723-0.900)
Lower Gorge		1950-2000	0.979 (0.961-0.997)	0.984 (0.883-1.096)	1.003 (0.882-1.141)	1.001 (0.899-1.116)

Table E.2.2.4. Probability that the abundance trend or growth rate of Columbia River chum salmon is less than one. The  $\lambda$  calculation is an estimate of what the natural growth rate would have been after accounting for hatchery-origin spawners. Two different time series estimates are available for the Grays River Population.

Population		Years of Time Series	Long-Term		Short-Term	
			Prob. Trend < 1	Prob. $\lambda < 1$	Prob. Trend < 1	Prob. $\lambda < 1$
Grays River	Rawding estimate	1967-1998	0.001	0.197	Not enough data	Not enough data
	Hymer et al. estimate	1951-2000	0.776	0.774	0.759	0.934
	Lower Gorge	1950-2000	0.987	0.657	0.478	0.494

Final abundance estimates for 2002 are also not available, but preliminary estimates have been received (Rawding, pers. comm.). The preliminary estimates suggest a substantial increase in abundance in 2002 over what has been observed over the last 50 years. Survey crews handled over 7,000 chum salmon carcasses in the Grays River in 2002, but the total population size is in the neighborhood of 10,000 adults (Figure E.2.2.4). However, a new chum salmon hatchery program in the Grays River started in 1999 confounds the abundance estimates as hatchery returns are included in the 10,000 adult estimate. The hatchery fish were otolith marked, so it will be possible to determine the fraction of hatchery-origin spawners once the otoliths are read, but that information is not available at this time. The Chinook River is a sub-population of the Grays River population that had essentially no chum salmon in recent years, prior to 2002 return of hatchery fish. In 2002, a preliminary estimate of 600 chum salmon returned to the Chinook River, suggesting a 1% return of 3-year-olds from the hatchery fish. Potential causes of this increase in 2002 are discussed below. No estimates of 2001 abundance were available from WDFW at the time of this report, though run was described as "...large, though not as large as 2002."

**Lower Gorge Population**—The Lower Gorge population consists of a number of subpopulations immediately below Bonneville dam. The subpopulations include Hardy Creek, Hamilton Creek, Ives Island, and the Multnomah area. Both the Ives Island and Multnomah area sub-populations spawn in the Columbia mainstem. The time series used for analysis of the Lower Gorge population is based on summing the abundance in the Hardy Creek, Hamilton Creek, and the artificial spawning channel in Hamilton Creek (Tables E.2.2.1- E.2.2.3, Figures E.2.2.6- E.2.2.7). There is some question about whether or not these data provided a representative index of the population, as it does not include the mainstem spawning areas. Chum salmon may alternate between the tributaries and the mainstem, depending on flow conditions, causing counts in only a subset of the population to be poor indicators of the total population abundance in any given year. Based on these data, the population has shown a downward trend since the 1950s and has been at relatively low abundance up to 2000. However, preliminary data indicate that the 2002 abundance has shown a substantial increase estimated at greater than 2,000 chum salmon in the Hamilton and Hardy creeks, plus another 8,000 or more in the mainstem. There have been no hatchery releases in the lower gorge population, so hatcheries are not responsible for this increase in 2002 unless there has been long distance straying from

Grays River (>100 km). Potential causes of the 2002 increase are discussed below. No estimates of 2001 abundance were available from WDFW at the time of this report, though run was described as “...large, though not as large as 2002.”

**Washougal Population**—Chum salmon were recently observed (within the last 3-4 years) to be spawning in the mainstem Columbia River on the Washington side, near the I-205 bridge (at Woods Landing and Rivershore). These spawners would be considered part of the WLC-TRT’s Washougal population, as that is the nearest tributary mouth. It is not clear if this is a recently established population or only recently discovered by WDFW. Genetic analysis indicates that the fish currently spawning in this area are more closely related to fish in the lower gorge area than to fish in Grays River (Marshall 2001). In 2000, WDFW estimated 354 spawners at this location (Figure E.2.2.8). As with the two other Columbia chum salmon spawning populations, preliminary data indicate a dramatic increase in 2002. Preliminary estimates put the 2002 abundance of this population in the range of several thousand spawners.

**Upper Gorge Population**—A large portion of the upper gorge population chum salmon habitat is believed to have been inundated by Bonneville Dam. However, small numbers of chum salmon still pass Bonneville Dam (Figure E.2.2.9). The number of fish passing Bonneville showed some increase in 2002, but not the dramatic increases estimated in the other three populations.

## Other Washington populations

In 2000, the Pacific States Marine Fisheries Commission conducted a study to determine the distribution and abundance of chum salmon in on the Washington side of the Columbia River. The results of that survey are shown in Figure E.2.2.8. Very small numbers of chum salmon were observed in several locations, but with the possible exception of the Washougal River mainstem (“I-205) population (discussed above), none of the populations would be considered close to self-sustaining abundances.

## Oregon populations

Chum salmon spawn on the Oregon side of the lower gorge population (Multnomah area), but appear to be essentially absent from other populations in the Oregon portion of this ESU. In 2000, ODFW conducted surveys with a similar purpose to the WDFW 2000 surveys (i.e., to determine the abundance and distribution of chum salmon in the Columbia). Out of 30 sites surveyed, only one chum salmon was observed. With the exception of the Lower Gorge population, Columbia chum salmon are considered extirpated, or nearly so, in Oregon.

## Reason for 2002 increase in abundance

It is not known why the Columbia chum salmon dramatically increased in abundance in 2002. As of the writing of this draft, the run has just ended and firm abundance estimates are not even available yet. However, several hypotheses have already been floated regarding this increase. These include:

- Improved ocean conditions

- Grays River and Chinook River hatchery program
- Columbia river mainstem flow agreements (the lower gorge population is in the tailrace of Bonneville Dam and subject to hydrosystem induced flow fluctuations)
- Favorable freshwater conditions
- Increased sampling effort (Since the 2000 survey, effort seems to have increased, though this alone certainly does not explain the apparent increase).

These are all possible contributors to the increase, but the reason for the increase is not known, just as it is not known exactly why chum salmon were restricted to low abundance and limited distribution for the last 50 year. It does not appear that chum salmon have expanded their range in 2002 beyond the Grays River, Lower Gorge, and I-205 areas, though not all the data on the 2002 survey has been reported. Since the cause of the 2002 increase is unknown, it is impossible to know if it will continue. The 2002 increase in Columbia River chum parallels a recent increase in Puget Sound chum. It is not known if the reasons for the increase in the two regions are the same.

### **EDT-based estimates of historical abundance**

The Washington Department of Fish and Wildlife (WDFW) has conducted analyses of Columbia River chum salmon populations using the Ecosystem Diagnosis and Treatment (EDT) model, which attempts to predict fish population performance based on input information about reach-specific habitat attributes (<http://www.olympus.net/community/dungenesswc/EDT-primer.pdf>). WDFW populated this model with estimates of historical habitat condition, which produced the estimates of average historical abundance shown in Table E.2.2.1. There is a great deal of unquantified uncertainty in the EDT historical abundance estimates, which should be taken into consideration when interpreting these data. In addition, the habitat scenarios evaluated as “historical” may not reflect historical distributions, since some areas that were historically accessible but currently blocked by large dams are omitted from the analyses and some areas that were historically inaccessible but recently passable because of human intervention are included. The EDT outputs are provided here to give a sense of the historical abundance of populations relative to each other and an estimate of the historical abundance relative to the current abundance.

### **Loss of habitat from barriers**

An analysis was conducted by Steel and Sheer (2002) to assess the number of stream km historically and currently available to salmon populations in the Lower Columbia River (Table E.2.2.5). Stream km usable by salmon are determined based on simple gradient cut offs and on the presence of impassable barriers. This approach will over estimate the number of usable stream km, as it does not take into consideration habitat quality (other than gradient). This is likely especially true of chum salmon with seem to prefer particular microhabitats for spawning.

Table E.2.2.5. Loss of habitat from barriers. The potential current habitat is the kilometers of stream below all currently impassable barriers between a gradient of 0% and 3.5%. The potential historical habitat is the kilometers of stream below historically impassable barriers between a gradient of 0% and 3.5%. The current to historical habitat ratio is the percent of the historical habitat that is currently available. This table does not consider habitat quality.

<b>Population</b>	<b>Potential Current Habitat (%)</b>	<b>Potential Historical Habitat (km)</b>	<b>Current to Historical Habitat Ratio</b>
Youngs Bay	269	287	94
Grays River (Hymer)	229	230	100
Grays River (Rawding)	229	230	100
Big Creek	369	407	91
Elochoman River	242	242	100
Clatskanie River	160	165	97
Mill, Abernathy, Germany	266	306	87
Scappoose Creek	888	1,048	85
Cowlitz River	114	120	95
Kalama River	382	579	66
Lewis River	319	362	88
Salmon Creek	416	471	88
Clackamas River	148	194	76
Sandy River	125	240	52
Washougal river	81	82	99
Lower Gorge Tributaries	55	77	71
Upper Gorge Tributaries			
Total	4,292	5,041	85

### **E.2.2.3 New ESU Information**

Updated information provided in this report, the information contained in previous LCR status reviews, and preliminary analyses by the WLC-TRT suggest that 14 of the 16 historical populations (88%) are extinct or nearly so. The two extant populations have been at low abundance for the last 50 years in the range where stochastic processes could lead to extinction. Encouragingly, there has been a substantial increase in the abundance of these two populations. In addition there are the new (or newly discovered) Washougal River mainstem spawning groups. However, it is not known if the increase will continue and the abundance is still substantially below the historical levels.

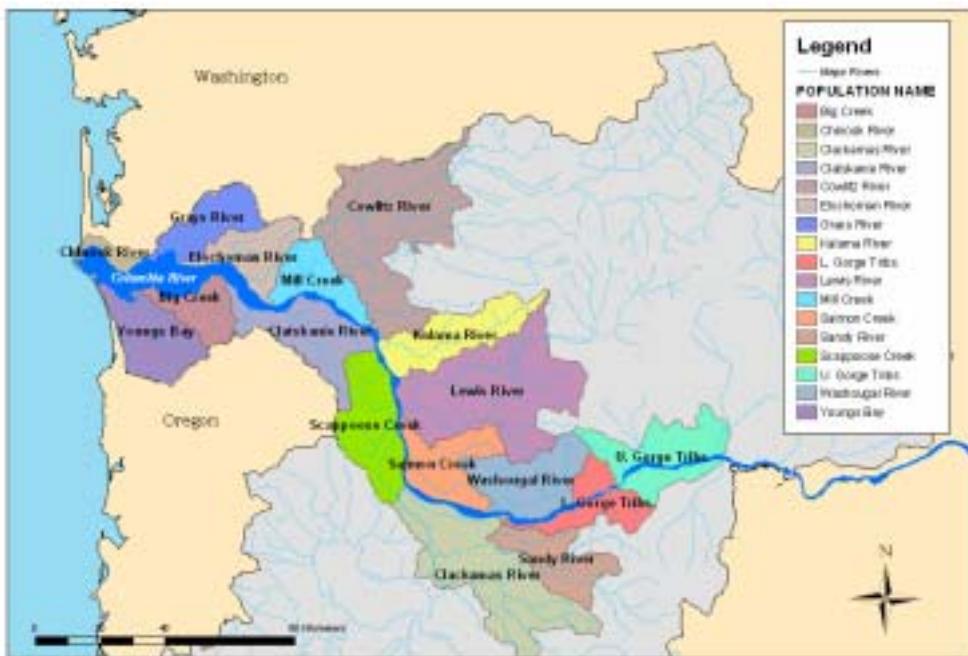


Figure E.2.2.1. Historical chum salmon populations in the Columbia River chum salmon ESU. This map does not reflect the most recent modification of the population designation which merged the Grays River and Chinook River chum salmon into a single population for a total of 16 populations (Myers et al. 2002).

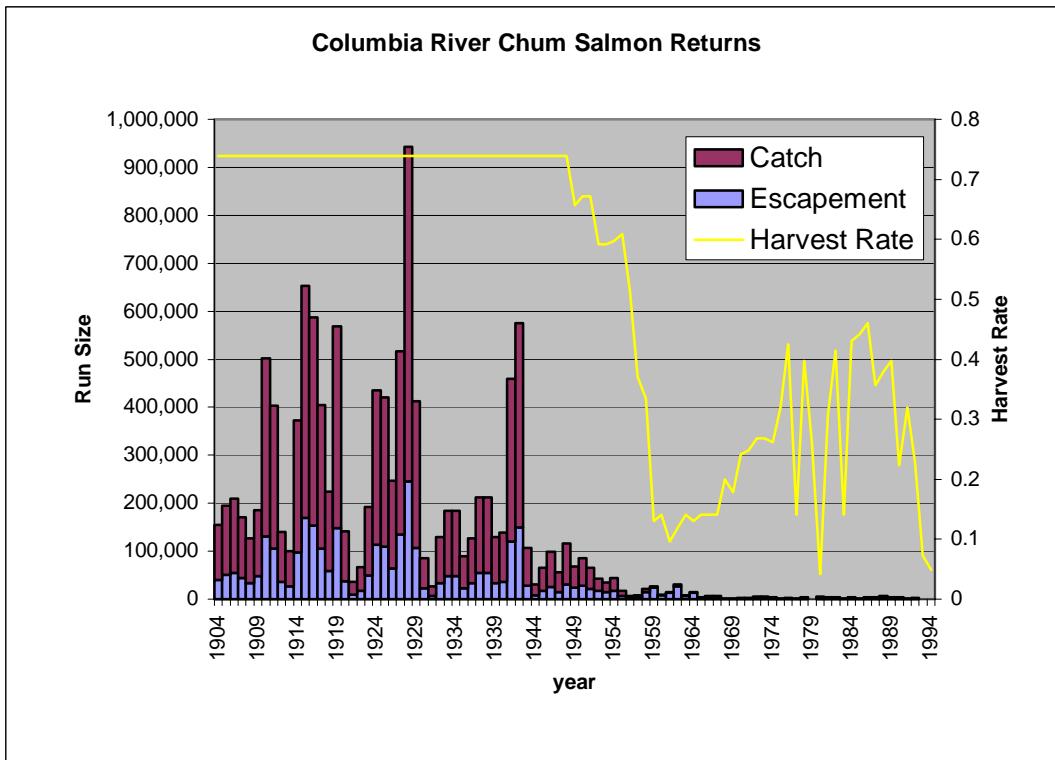


Figure E.2.2.2. Columbia River chum salmon returns.

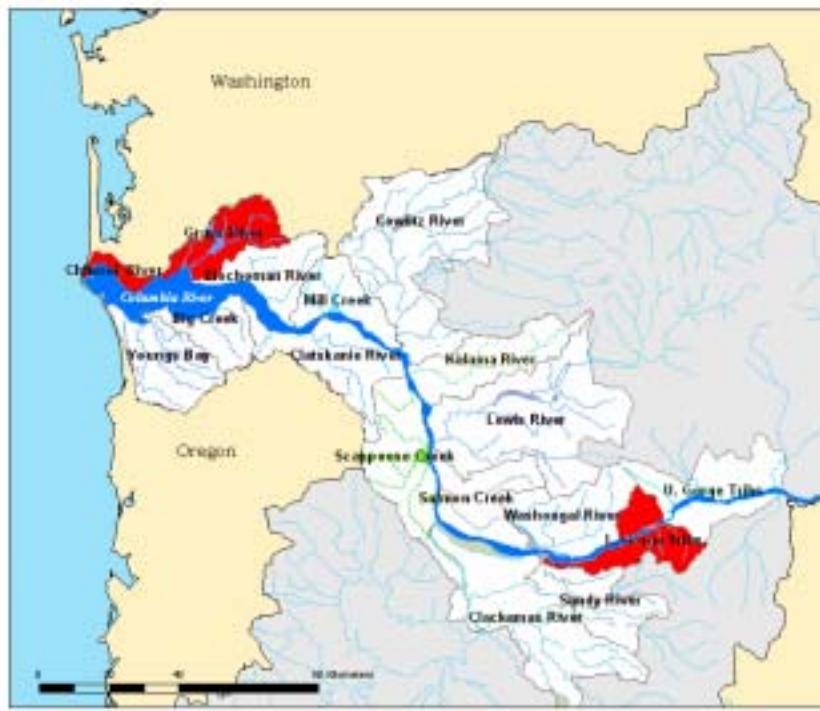


Figure E.2.2.3. Extant Columbia River chum salmon populations.

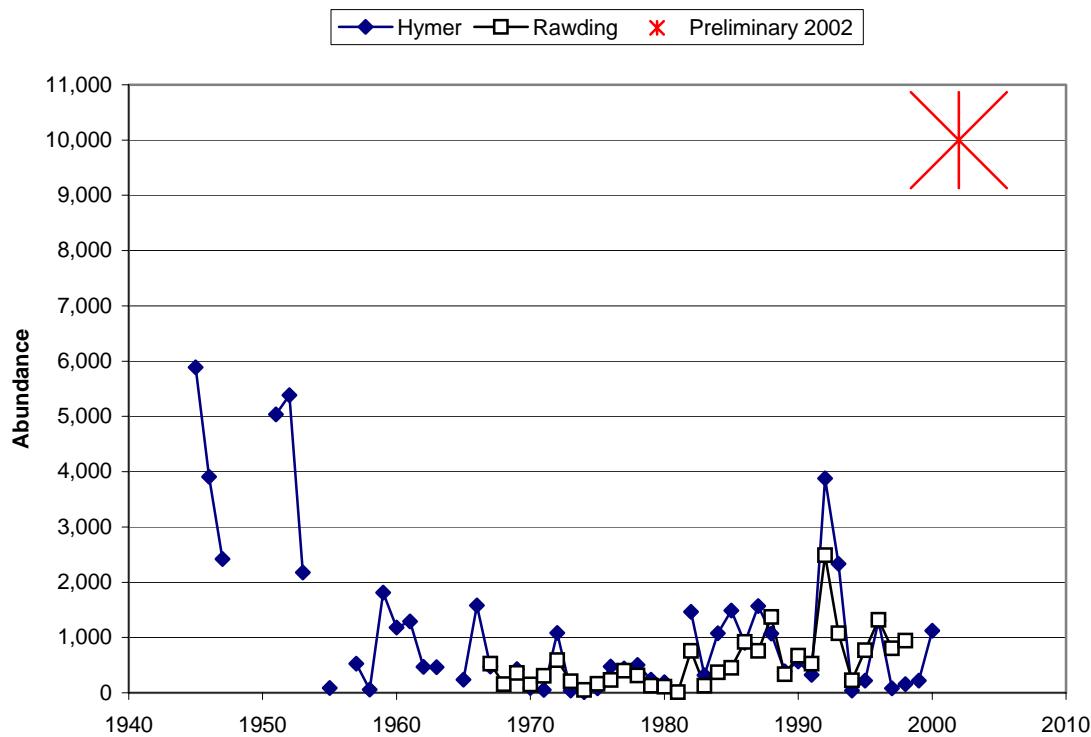


Figure E.2.2.4. Gray's River chum salmon abundance estimate. The two data sets use different information and expansions to estimate the Grays River chum salmon abundance. The 2002 data are preliminary and include an unknown number of hatchery-origin spawners.

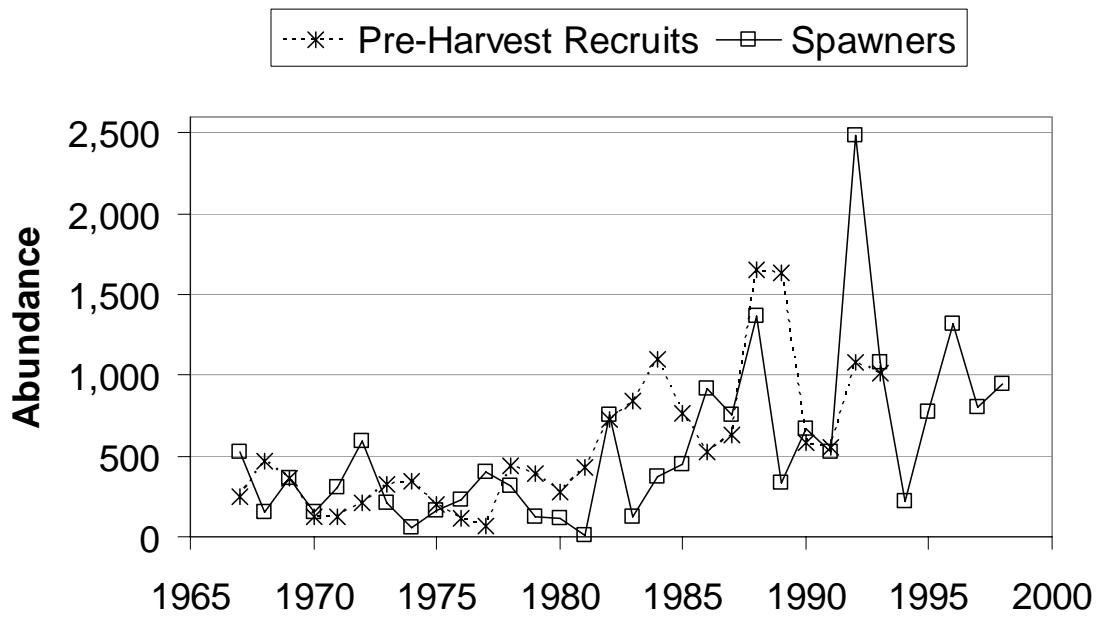


Figure E.2.2.5. Grays River chum salmon recruits and spawners. Based on dataset provided by Rawding (2002; see Appendix E.5.2).

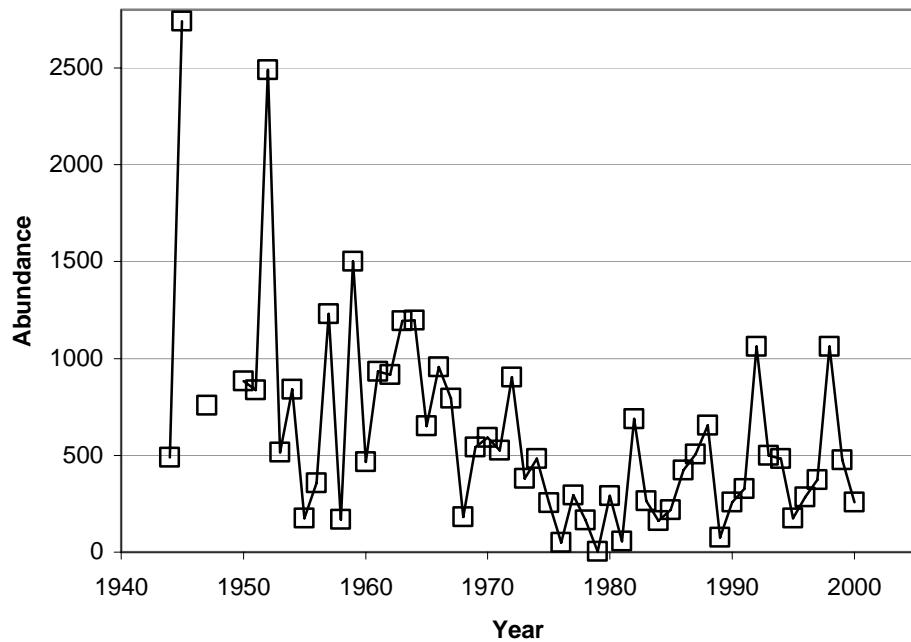


Figure E.2.2.6. Hamilton and Hardy Creek (Lower Gorge population) chum salmon spawner abundance.

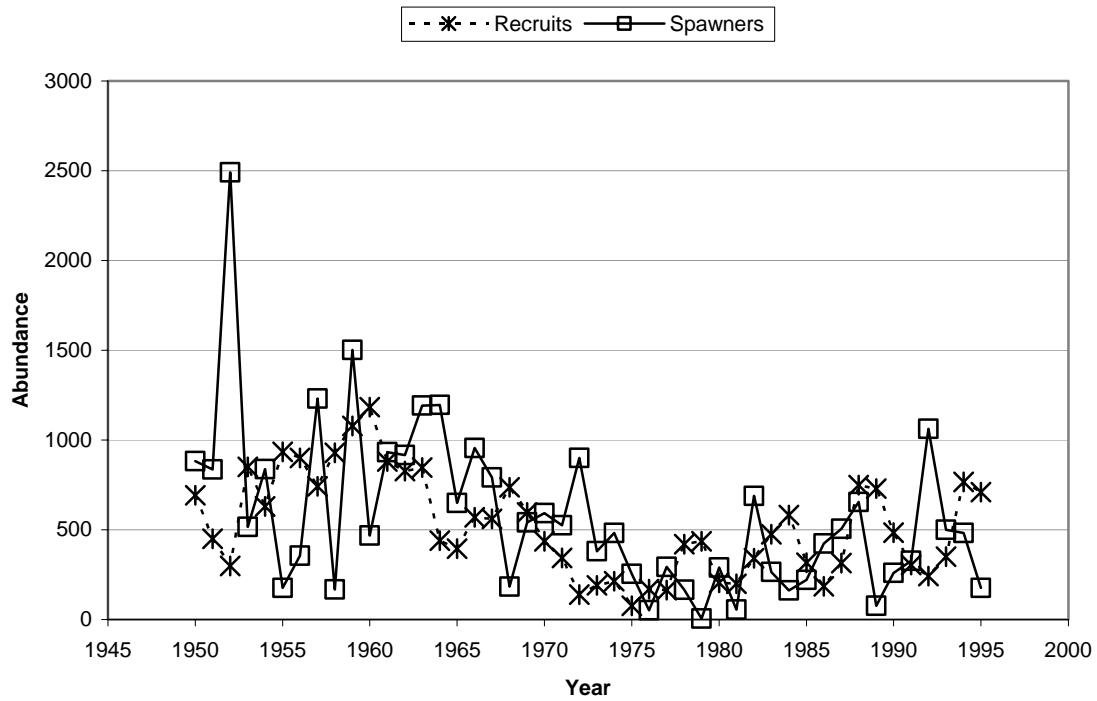


Figure E.2.2.7. Hamilton and Hardy Creek (Lower Gorge population) chum salmon recruits and spawners.

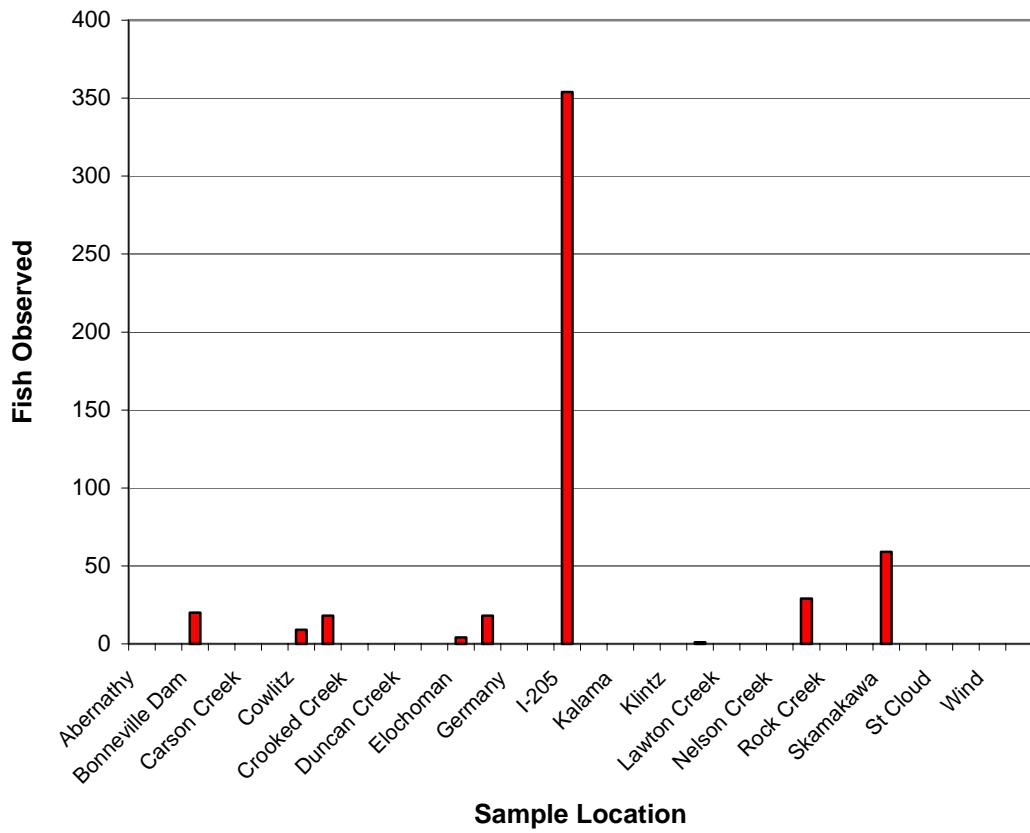


Figure E.2.2.8. Abundance of chum salmon observed in 2000 PSMFC surveys.

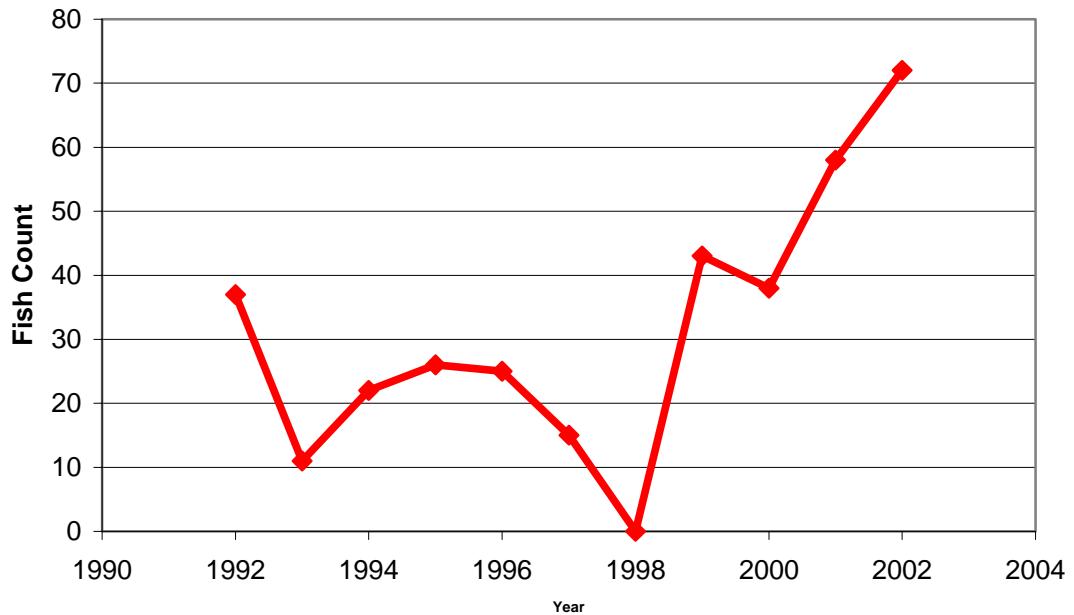


Figure E.2.2.9. Adult chum salmon passing Bonneville Dam.

## **E.3 CHUM SALMON BRT CONCLUSIONS**

### **Hood Canal summer-run chum salmon ESU**

Most of the BRT votes for this ESU fell in the “likely to become endangered” category (74%), with a minority in the “danger of extinction” category (32%) and the balance in the “not likely to become endangered” category (Table E.3.1). Mean risk matrix scores were moderately high (3.4-3.7) for each VSP element (Table E.3.2), reflecting ongoing BRT concerns for the major risks identified in previous assessments. An estimated 7 of 16 historical populations in this ESU have been extirpated, with most of the population losses occurring on the eastern side of Hood Canal. Although many of the remaining populations remain at very depressed levels, adult returns in a number of streams increased in 2000-2002. Harvest rates have been reduced considerably since their peaks in the 1980s, which should help facilitate recovery if other limiting factors are addressed. The BRT felt that the joint state/tribal Summer Chum Salmon Conservation Initiative represented a positive step toward recovery of this ESU. However, although the Initiative includes guidelines for habitat restoration, implementation of habitat actions is largely outside its jurisdiction. In particular, the BRT remains concerned that widespread loss of estuary and lower floodplain habitat is an ongoing risk factor for this ESU. A number of supplementation programs have been initiated in recent years to help boost abundance of local populations. Although these programs may help speed recovery of existing populations and/or reseed vacant habitat, the BRT found it difficult to assess the current effects of these programs because of the inability to distinguish most hatchery and wild fish. More intensive marking programs have been implemented recently, and this should make it easier to monitor natural production of summer chum salmon in the future.

### **Lower Columbia River chum salmon ESU**

Nearly all of the likelihood votes for this ESU fell in the “likely to become endangered” (63%) or “danger of extinction” (34%) categories (Table E.3.1). The BRT had substantial concerns about every VSP element, as indicated by mean risk matrix scores that ranged from 3.5 for growth rate/productivity to 4.4 for spatial structure (Table E.3.2). Most or all of the risk factors identified previously by the BRT remain important concerns. The WLC TRT has estimated that close to 90% of the historical populations in the ESU are extinct or nearly so, resulting in loss of much diversity and connectivity between populations. The populations that remain are small, and overall abundance for the ESU is low. This ESU has showed low productivity for many decades, even though the remaining populations are at low abundance and density dependent compensation might be expected. The BRT was encouraged that unofficial reports for 2002 suggest a large increase in abundance in some (perhaps many) locations. Whether this large increase is due to any recent management actions or simply reflects unusually good conditions in the marine environment is not known at this time, but the result is encouraging, particularly if it were to be sustained for a number of years.

Table E.3.1. Tally of FEMAT vote distribution regarding the status of 2 chum salmon ESUs reviewed by the chum salmon BRT.  
Each of 13 BRT members allocated 10 points among the three status categories.

<b>ESU</b>	<b>Danger of Extinction</b>	<b>Likely to Become Endangered</b>	<b>Not Likely to Become Endangered</b>
Hood Canal summer-run	25	89	6
Lower Columbia River	44	82	4

Table E.3.2. Summary of risk scores (1 = low to 5 = high) for four VSP categories (see section "Factors Considered in Status Assessments" for a description of the risk categories) for the 2 chum salmon ESUs reviewed. Data presented are means (range).

<b>ESU</b>	<b>Abundance</b>	<b>Growth Rate/Productivity</b>	<b>Spatial Structure and Connectivity</b>	<b>Diversity</b>
Hood Canal summer-run	3.7 (3-4)	3.4 (2-4)	3.7 (3-5)	3.5 (2-4)
Lower Columbia River	3.6 (3-4)	3.5 (2-4)	4.4 (4-5)	3.8 (3-5)

## E.4 REFERENCES

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## E.5 APPENDICES

Appendix E.5.1. Preliminary SSHAG (2003) categorizations of hatchery populations of chum salmon of the two ESUs reviewed.  
See “Artificial Propagation” in General Introduction for explanation of the categories.

ESU	Stock	Run	Basin	SSHAG Category
Hood Canal summer	Big Quilcene	summer	Quilcene	1a
	Lilliwaup Creek	summer	S. Hood Canal	1a
	Hamma Hamma	summer	S. Hood Canal	1a
	Big Beef Creek	summer	N. Hood Canal	1b
	Salmon Creek	summer	Dungeness	1a
	Chimacum Creek	summer	Dungeness	1b
	Union River	summer	Union	1a
	Jimmycomelately	summer	Dungeness	1a
Lower Columbia River	Sea Resources	fall	Chinook River	1a
	Gorley Creek	fall	Grays	1a
	Hamilton Creek	fall	Gorge	1a
	Washougal/Duncon Creek	fall	Washougal	1a

## Appendix A.5.2. Chum Salmon Time Series Data Sources

<b>Hood Canal Chum Salmon ESU</b>	
Population	Anderson 1970-2002
Years of Data, Length of Series	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
Abundance Type	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)
Abundance Notes	Redd count expanded by 2 (assumes 1:1 male female ratio). Counts include all ages
Hatchery Reference	No supplemental hatchery program
Hatchery Notes	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)
Harvest Reference	The offshore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Anderson is that from the areas 12B, 12, and 9A.
Harvest Notes	Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)
Age Reference	Spawner survey; n=10 fish sampled from 2001-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)
Age Notes	

Population	Big Beef
Years of Data, Length of Series	1968-2002
Abundance Type	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap. Includes all ages.
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, personal communication (Johnson 2003b)
Abundance Notes	Redd count expanded by 2 (assumes 1:1 male female ratio). Counts include all ages
Hatchery Reference	Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)
Hatchery Notes	Supplementation program was started with releases in basin in 1996. No sampling for hatchery marks on escapement grounds, but assume that all returns after 1996 are from hatchery plants since there have been no returns for several years prior.
Harvest Reference	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)
Harvest Notes	The off shore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Big Beef is that from the areas 12B, 12, and 9A.
Age Reference	Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region

(WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)

Trap, spawner survey; n=396 fish sampled from 200-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)

Population	Big Quillcene
Years of Data, Length of Series	1968-2002
Abundance Type	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)
Abundance Notes	Redd count expanded by 2 (assumes 1:1 male female ratio) Method - area under the curve, 10 day stream life. Escapement counts include all ages.
Hatchery Reference	Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)
Hatchery Notes	Supplementation program started in 1992 in the Big Quillcene River. Broodstock is taken from returning fish; eggs are incubated, and fry released into the Big Quillcene.
Harvest Reference	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)
Harvest Notes	The off shore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for

Age Reference	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)
Age Notes	From bay fisheries, spawner surveys; n=3770 fish sampled from 1992-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)

Population	Chimacum
Years of Data, Length of Series	1999-2002
Abundance Type	?
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, personal communication (Johnson 2003b)
Abundance Notes	Returns come from recent hatchery plants to system. Escapement counts include all ages
Hatchery Reference	Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)
Hatchery Notes	Reintroduction program started in 1996 when eyed eggs were transferred in from Salmon Creek.
Harvest Reference	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)
Harvest Notes	The off shore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv.

Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. There is no terminal catch area for Chinook.

Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)

Trap, spawner survey; n=537 fish sampled from 1999-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)

#### Age Reference

Population	Combined Quilcene
Years of Data, Length of Series	1974-2002
Abundance Type	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)
Abundance Notes	Redd count expanded by 2 (assumes 1:1 male female ratio). Escapement counts include all ages.
Hatchery Reference	Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)
Hatchery Notes	CWT Otolith sampling for hatchery marks
Harvest Reference	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan

de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables  
(Nick Lampkis 2003)

**Harvest Notes**

The off shore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Quilcene is that from areas 82F, 12A, 12B, 12, and 9A implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)

From bay fisheries, trap, spawner surveys; n=4076 fish sampled from 1992-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)

<b>Population</b>	Dewatto
<b>Years of Data, Length of Series</b>	1968-2002
<b>Abundance Type</b>	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
<b>Abundance References</b>	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)
<b>Abundance Notes</b>	Redd count expanded by 2 (assumes 1:1 male female ratio). Escapement counts include all ages
<b>Hatchery Reference</b>	Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)
<b>Hatchery Notes</b>	No broodstock take
<b>Harvest Reference</b>	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer

Harvest Notes	The off shore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Dewatto is that from the areas 12C, 12B, 12, and 9A
Age Reference	Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)
Age Notes	Spawner survey; n=5 fish sampled from 2001-2001. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)
Population	Dosewallips
Years of Data, Length of Series	1972-2002
Abundance Type	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)
Abundance Notes	Redd count expanded by 2 (assumes 1:1 male female ratio). Escapement counts include all ages
Hatchery Reference	Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)
Hatchery Notes	There are no hatchery releases in basin. There may be some from nearby hatchery summer chum releases, but it is not sampled. Hatchery impact on natural spawners assumed to be zero.
Harvest Reference	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer

chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)

#### Harvest Notes

The off shore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Dosewallips is that from the areas 12B, 12, and 9A

Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)

Trap, spawner survey; n=500 fish sampled from 1999-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)

#### Age Reference

#### Age Notes

Population	Duckabush
Years of Data, Length of Series	1968-2002
Abundance Type	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)
Abundance Notes	Redd count expanded by 2 (assumes 1:1 male female ratio). Escapement counts include all ages
Hatchery Reference	Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)
Hatchery Notes	No hatchery releases or broodstock take in the Duckabush

**Harvest Reference**

Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)

**Harvest Notes**

The off shore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Duckabush is that from fishing areas 12B, 12, 9A.

**Age Reference**

Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)

**Age Notes**

Trap, spawner survey; n=326 fish sampled from 1999-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)

Population	Hamma Hamma
Years of Data, Length of Series	1968-2002
Abundance Type	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)

**Abundance Notes**

Redd count expanded by 2 (assumes 1:1 male female ratio). Escapement counts include all ages

Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)

Hatchery Notes

Supplementation program was started with broodstock taken in 1998; assumed that there was no hatchery straying into basin prior to hatchery releases in basin.

Harvest Reference

Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)

Harvest Notes

The offshore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Hamma Hamma is that from the areas 12B, 12, 9A

Age Reference

Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)

Age Notes

Trap, seine, spawner survey; n=386 fish sampled from 1999-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)

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Population

Years of Data, Length of Series

Abundance Type

Abundance References

Jimmy come lately

1974-2002

Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap

Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, personal communication (Johnson 2003b)

Abundance Notes

Hatchery Reference

Escapement counts include all ages

Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for

the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)

**Hatchery Notes**

**Harvest Reference**

Supplementation program started with 1999 broodyear

Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No.

3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)

**Harvest Notes**

The offshore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Jimmy come lately is that from the Sequim area.

**Age Reference**

Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)

**Age Notes**

Trap, spawner survey; n=233 fish sampled from 1999-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)

Population	Lilliwaup
Years of Data, Length of Series	1971-2002
Abundance Type	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No.

3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)

Redd count expanded by 2 (assumes 1:1 male female ratio). Escapement counts include all ages

**Abundance Notes**

Hatchery Reference

Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)

Harvest Notes

Supplementation program was started with broodstock take in 1992  
Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)

Harvest Notes

The offshore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Lilliwaup is that from the areas 12C, 12B, 12, and 9A

Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)

Trap, spawner survey; n=233 fish sampled from 1999-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)

Population

Years of Data, Length of Series

Abundance Type

Abundance References

Little Quilcene

1968-2002

Method - area under the curve, 10 day stream life.

Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)

Abundance Notes  
Hatchery Reference

Redd count expanded by 2 (assumes 1:1 male female ratio). Escapement counts include all ages.  
Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)

Hatchery Notes

Supplementation program started in 1992 in the Big Quilcene River. Broodstock is taken from Big Quilcene and fry released into the Big Quilcene. Some return to Little Quilcene.

Harvest Reference

Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampakis 2003)

Harvest Notes

The off shore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Little Quilcene is that from the areas 12A, 12B, 12, and 9A.

Age Reference

Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)

Age Notes

From bay fisheries, spawner survey, seine in bay, rack; n=2599 fish sampled from 1992-2002.  
Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)

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Population	Salmon
Years of Data, Length of Series	1971-2002
Abundance Type	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan

Abundance Notes	de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, personal communication (Johnson 2003b)
Hatchery Reference	Redd count expanded by 2 (assumes 1:1 male female ratio). Escapement counts include all ages Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)
Hatchery Notes	Supplementation program was started in 1992
Harvest Reference	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)
Harvest Notes	The off shore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Salmon is that from the Discovery Bay.
Age Reference	Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003ab)
Age Notes	Trap, spawner survey; n=1087 fish sampled from 1999-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)
Population	Salmon/Snow
Years of Data, Length of Series	1974-2002
Abundance Type	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No.

3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)

Abundance Notes  
Hatchery Reference

Redd count expanded by 2 (assumes 1:1 male female ratio). Escapement counts include all ages  
Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)

Hatchery Notes  
Harvest Reference

Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)

The off shore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Salmon and Snow is that from Discovery Bay.

Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thorn Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)

Trap, spawner survey; n=1227 fish sampled from 1999-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)

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Population	Snow
Years of Data, Length of Series	1972-2002
Abundance Type	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point

Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, personal communication (Johnson 2003)	
Abundance Notes	Redd count expanded by 2 (assumes 1:1 male female ratio). Escapement counts include all ages
Hatchery Reference	Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)
Hatchery Notes	No estimate of hatchery fish contribution to spawners
Harvest Reference	Summer Chum Salmon Conservation Initiative. An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)
Harvest Notes	The off shore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Salmon and Snow is that from Discovery Bay.
Age Reference	Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)
Age Notes	Trap, spawner survey; n=140 fish sampled from 1999-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)
Population	Tahuya
Years of Data, Length of Series	1972-2002
Abundance Type	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer

chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, personal communication (Johnson 2003b)

Redd count expanded by 2 (assumes 1:1 male female ratio). Escapement counts include all ages

Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)

No estimate of hatchery contribution to spawners

Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)

The off shore catch includes marine catch from Seattle Area 10, Admiralty Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Tahuya is that from the areas 12D, 12C, 12B, 12, and 9A.

Abundance Notes

Hatchery Reference

Hatchery Notes

Harvest Reference

Harvest Notes

Age Reference

Age Notes

Population	Union
Years of Data, Length of Series	1974-2002
Abundance Type	Trap count (excluding broodstock take adjustment) plus redd counts downstream of trap
Abundance References	Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables

(Nick Lampkis 2003)

Abundance Notes

Hatchery Reference

Hatchery Notes  
Harvest Reference

Harvest Notes

Age Reference

Age Notes

Redd count expanded by 2 (assumes 1:1 male female ratio). Escapement counts include all ages Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001)

Supplementation program was started with broodstock take in 2000

Summer Chum Salmon Conservation Initiative: An implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca Region (WDFW & Point No Point Treaty Tribes 2000); Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Run Reconstruction Tables (Nick Lampkis 2003)

The offshore catch includes marine catch from Seattle Area 9, U.S. Conv. Areas and Canadian Area 20. For summer chum these are assumed to be mature fish returning to spawning grounds. Catches by population/stock are determined from the run reconstruction tables given in the Summer Chum Salmon Conservation Initiative report. The terminal catch for Union is that from the Sequim area.

Summer Chum Salmon Conservation Initiative. Supplemental Report No. 3 Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca Region (WDFW and Point No Point Treaty Tribes 2001); Thom Johnson, unpublished 2001 and 2002 age data, personal communication (Johnson 2003a,b)

Trap, spawner survey; n=317 fish sampled from 1999-2002. Age distribution reconstructed for other years using average cohort distribution weighted by annual abundance of contributing years (Norma Sands)

### Columbia River Chum Salmon ESU

Population	Grays River Chum Salmon
Years of Data, Length of Series	1945 - 2000, 34 years
Abundance Type	Live/dead index
Abundance References	Hymer, Joe. 2000; Keller, Ken. 2001; Keller, Ken and Richard Bruce. 2001
Abundance Notes	1999 and 2000 data downloaded from Streamnet; references are Keller and Keller and Bruce

Hatchery Reference	Rawding, Dan (WDFW). 2001c.
Hatchery Notes	There has been no significant contribution of hatchery fish to the Grays River chum salmon population
Harvest Reference	Rawding, Dan (WDFW). 2001c.
Harvest Notes	There has been no significant directed harvest on Columbia chum salmon for the duration of the time series. Indirect harvest is believed to be negligible
Age Reference	Salo, E. O. 1991.
Age Notes	LCR_Wil Chinook Chum Steelhead from Holmes and McClure
Population	Grays River Chum Salmon
Years of Data, Length of Series	1967 - 1998, 34 years
Abundance Type	Live/dead index
Abundance References	Rawding, 2001
Abundance Notes	
Hatchery Reference	Rawding, Dan (WDFW). 2001c.
Hatchery Notes	There has been no significant contribution of hatchery fish to the Grays River chum salmon population
Harvest Reference	Rawding, Dan (WDFW). 2001c.
Harvest Notes	There has been no significant directed harvest on Columbia chum salmon for the duration of the time series. Indirect harvest is believed to be negligible
Age Reference	Salo, E. O. 1991.
Age Notes	LCR_Wil Chinook Chum Steelhead from Holmes and McClure
Population	Lower Gorge Tributary Chum Salmon (Hamilton Cr, Hamilton Sp. & Hardy Cr Chum)
Years of Data, Length of Series	1944 - 2000, 57 years
Abundance Type	Live/dead index
Abundance References	Rawding, Dan (WDFW). 2001c.
Abundance Notes	Rawding provided separate time series for each subpopulation that were combined for analysis
Hatchery Reference	Rawding, Dan (WDFW). 2001c.
Hatchery Notes	There has been no (or extremely little) hatchery impact on Hardy Creek chum salmon.
Harvest Reference	Rawding, Dan (WDFW). 2001c.

Harvest Notes

Age Reference

Age Notes

There has been no significant directed harvest on Columbia chum salmon for the duration of the time series. Indirect harvest is believed to be negligible  
Salo, E. O. 1991.  
LCR\_Wil Chinook Chum Steelhead from Holmes and McClure